

**FCC 15.407
(Permissive Change)
WLAN 6GHz Test Report**

for

LG Electronics Inc.

**222, LG-ro, Jinwi-myeon Pyeongtaek-Si, Gyeonggi-Do,
17709 Republic of Korea**

Product Name : Notebook Computer
**Model Name : (1)17Z90R (2)17ZB90R
(3)17ZD90R (4)17ZG90R**
Brand : LG
FCC ID : BEJNT-17Z90R

**Prepared by: : AUDIX Technology Corporation,
EMC Department**



The test report is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.

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TEST REPORT (Permissive Change)

Applicant : LG Electronics Inc.
Manufacturer : LG Electronics Inc.
Factory : LG Electronics Nanjing New Technology Co., Ltd.
EUT Description
(1) Product : Notebook Computer
(2) Model : (1)17Z90R (2)17ZB90R (3)17ZD90R (4)17ZG90R
(3) Brand : LG
(4) Power Supply: DC 20V, 3.25A

Applicable Standards:

Title 47 FCC CFR Part 15 Subpart E

Audix Technology Corp. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Audix Technology Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Report: 2023. 07. 19

Reviewed by:



(Sabrina Wang/Administrator)

Approved by:



(Johnny Hsueh/Section Manager)

1. REVISION RECORD OF TEST REPORT

| Edition No | Issued Date | Revision Summary | Report Number |
|------------|--------------|------------------|---------------|
| 0 | 2023. 07. 19 | Original Report | EM-F230337 |

2. SUMMARY OF TEST RESULTS

| FCC Part Section(s) | Description | Results |
|---|---|------------------------------|
| 15.207 | Conducted Emission | PASS |
| 15.205/15.209 15.407 (b)(6) | Radiated Band Edge and Radiated Spurious Emission | PASS |
| 15.407(a)(8) | Maximum Power Spectral Density | N/A ^{Note3} |
| 15.407(a)(8) | Maximum Conducted Output Power | PASS ^{Note4} |
| 2.1049 15.407(a)(10) | Emission/Occupied Bandwidth | N/A ^{Note3} |
| 15.407(b)(6) | Undesirable emission limits: Spurious Emission (Conducted) | N/A ^{Note3} |
| 15.407(b)(7) | In-Band Emission (Channel Mask) | N/A ^{Note3} |
| 15.407(d)(6) | Contention Based Protocol | PASS |
| 15.203 | Antenna Requirement | Compliance |
| Note: 1. Decision rule according to the limit of the test standard chapter, the test value is lower than the limit specified in the test chapter, and it is judged as Pass. 2. The uncertainties value is not used in determining the result. 3. Due to add components can't influence on RF circuit, so it is unnecessary to re-test. 4. Due to add Touch Board for Panel and new Antenna. We did spot check for output power and all output power values keep identical original grant power. | | |

3. GENERAL INFORMATION

3.1. Description of Application

| | |
|----------------------|---|
| Applicant | LG Electronics Inc. 222, LG-ro, Jinwi-myeon Pyeongtaek-Si, Gyeonggi-Do, 17709 Republic of Korea |
| Manufacturer | LG Electronics Inc. 222, LG-ro, Jinwi-myeon Pyeongtaek-Si, Gyeonggi-Do, 17709 Republic of Korea |
| Factory | LG Electronics Nanjing New Technology Co., Ltd. No.346, Yaoxin Road, Economic & Technical Development Zone, Nanjing, China. |
| Product | Notebook Computer |
| Model | (1)17Z90R (2)17ZB90R (3)17ZD90R (4)17ZG90R The difference between all models is different in the sales customers and color difference. |
| Configuration (HVIN) | 17Z90R-K, 17Z90R-N, 17Z90R-A, 17Z90R-R, 17Z90R-Q, 17Z90R-H, 17Z90R-T |
| Brand | LG |

The model 17Z90R has following different configuration and components, and the details are as follows:

| Configuration(HVIN) Difference | Original | | | | Permissive Change | | |
|------------------------------------|--|----------|-------------|---|----------------------|--------------------|----------|
| | 17Z90R-A | 17Z90R-R | 17Z90R-K | 17Z90R-N | 17Z90R-Q | 17Z90R-H | 17Z90R-T |
| TPM (Trusted Platform Module) | Not Support | Support | Not Support | Support | Support | Support | Support |
| CPU | i7-1360P, i5-1340P | | | | i7-1370P i5-1350P | i7-1360P, i5-1340P | |
| Antenna | WA-P-LELE-04-011, L1LRF009-CS-H | | | | | WA-P-LBLB-04-108 | |
| LCD Panel (Include Touch Board) | Without | | | | | With | |
| Main Board | ROYAL NVIDIA MAIN B/D Note: Main Board (PM) | | | ROYAL MAIN B/D Note: Main Board (GM) | | | |
| GPU | NVIDIA GeForce RTX 3050 | | | Intel Iris Xe Graphics | | | |
| Battery | LBY122CM(90 Wh) | | | LBV7227E (80 Wh) | | | |

3.2. Description of EUT

| | | | |
|---|--|----------------------------------|----------|
| Test Model | 17Z90R | | |
| Serial Number | N/A | | |
| Power Rating | DC 20V, 3.25A | | |
| Software Version | XY (X, Y can be 0 to 9 for different SW version not influence RF parameter) | | |
| RF Features | WLAN: 802.11 a/b/g/n/ac/ax Bluetooth: BT and BLE (BT 5.1) | | |
| Transmit Type | 2.4 GHz | | |
| | 802.11b | | 1T1R |
| | 802.11g | | 1T1R |
| | 802.11n-HT20 | | 2T2R |
| | 802.11n-HT40 | | 2T2R |
| | 802.11ax-HE20 | | 2T2R |
| | 802.11ax-HE40 | | 2T2R |
| | BT/BLE | | 1T1R |
| | U-NII Bands | | |
| | 802.11a | | 1T1R |
| | 802.11n-HT20/802.11ac-VHT20/802.11ax-HE20 | | 2T2R |
| | 802.11n-HT40/802.11ac-VHT40/802.11ax-HE40 | | 2T2R |
| | 802.11ac-VHT80/802.11ax-HE80 | | 2T2R |
| | 802.11ac-VHT160/802.11ax-HE160 | | 2T2R |
| The MIMO is uncorrelated and supported SDM (Spatial Division Multiplexing) mode only. This radio device doesn't support beamforming and Cyclic Delay Diversity (CDD). | | | |
| Device Category | <input type="checkbox"/> Outdoor Access Point <input type="checkbox"/> Fixed point-to-point Access Point <input type="checkbox"/> Indoor Access Point <input checked="" type="checkbox"/> Mobile and Portable client device | | |
| Test Sample | Sample No. | Test Item | Firmware |
| | 03 | AC Conduction, RSE, Output Power | N/A |
| Sample Status | Trial sample | | |
| Date of Receipt | 2023. 06. 13 | | |
| Date of Test | 2023. 06. 26 ~ 07. 18 | | |
| Interface Ports of EUT | <ul style="list-style-type: none"> • One HDMI Port • Two USB Type C Port • One Earphone Port • One Micro SD Card Slot • Two USB 3.0 Ports | | |
| Accessories Supplied | <ul style="list-style-type: none"> • AC Adapter • USB C Cable • LAN Gender | | |

Note: Pursuant ISO 17025:2017 section 7.8.2, Audix Technology Corp. does not assume responsibility for all EUT's information including RF features, transmit type, antenna information...etc are provided by customer.

3.3. Reference Test Guidance

ANSI C63.10:2013
 KDB 789033 D02 v02r01, KDB 662911 D01 v02r01, KDB 987594 D02 v01r01

3.4. Information for Permissive Change

- The EUT is an addition version with original FCC ID: BEJNT-17Z90R is as following.
 - (a) To add new Configuration (HVIN) 17Z90R-Q, 17Z90R-H and 17Z90R-T.
 - (b) To add Touch Board for Panel and new Antenna for Main Board (GM) for new Configuration (HVIN) 17Z90R-H and 17Z90R-T.
- The differences between this application and original's ID as clarify in following list.

| Configuration(HVIN) Difference | Original | | | | Permissive Change | | |
|------------------------------------|--|----------|-------------|---|----------------------|-------------------------|----------|
| | 17Z90R-A | 17Z90R-R | 17Z90R-K | 17Z90R-N | 17Z90R-Q | 17Z90R-H | 17Z90R-T |
| TPM (Trusted Platform Module) | Not Support | Support | Not Support | Support | Support | Support | Support |
| CPU | i7-1360P, i5-1340P | | | | i7-1370P i5-1350P | i7-1360P, i5-1340P | |
| Antenna | WA-P-LELE-04-011, L1LRF009-CS-H | | | | | WA-P-LBLB-04-108 | |
| LCD Panel (Include Touch Board) | Without | | | | | With | |
| Main Board | ROYAL NVIDIA MAIN B/D Note: Main Board (PM) | | | ROYAL MAIN B/D Note: Main Board (GM) | | | |
| GPU | NVIDIA GeForce RTX 3050 | | | Intel Iris Xe Graphics | | | |
| Battery | LBY122CM(90 Wh) | | | LBV7227E (80 Wh) | | | |

- Due to above different item, there have some test item should be re-tested (see section 2), the test data are recorded in this report.

3.5. Antenna Information

| No. | Antenna Part Number | Manufacturer | Antenna Type | Frequency (MHz) | Max Gain(dBi) | | Directional Gain |
|-----|---------------------|--------------|--------------|-----------------|---------------|-------|------------------|
| | | | | | Aux | Main | |
| 1. | WA-P-LBLB-04-108 | INPAQ | Mono-Pole | 2400-2500 | 2.90 | 3.10 | 3.00 |
| | | | | 5150-5350 | 2.80 | -2.10 | 1.01 |
| | | | | 5470-5725 | 5.70 | 2.50 | 4.39 |
| | | | | 5725-5850 | 5.30 | 5.20 | 5.25 |
| | | | | 5925-6425 | 3.70 | 4.80 | 4.28 |
| | | | | 6425-6525 | -1.00 | 1.00 | 0.11 |
| | | | | 6525-6875 | 2.80 | 1.60 | 2.24 |
| | | | | 6875-7125 | -1.40 | 2.90 | 1.26 |

According to KDB 662911 D01 d) ii), transmit signals are completely uncorrelated, then
 Directional gain = $10 \log[(10^{G1/10} + 10^{G2/10} + \dots + 10^{GN/10})/N_{ANT}]$ dBi
 We chose the antenna gain corresponding to the frequency listed on the table which is closer to center frequency of WLAN.

3.6.EUT Specifications Assessed in Current Report

| Mode | U-NII Band | Fundamental Range (MHz) | Channel Number |
|----------------|------------|-------------------------|----------------|
| 802.11ax-HE20 | 5 | 5955-6415 | 24 |
| | 6 | 6435-6515 | 5 |
| | 7 | 6535-6855 | 17 |
| | 8 | 6875-7115 | 13 |
| 802.11ax-HE40 | 5 | 5965-6405 | 12 |
| | 6 | 6445-6485 | 2 |
| | 7 | 6525-6845 | 9 |
| | 8 | 6885-7085 | 6 |
| 802.11ax-HE80 | 5 | 5985-6385 | 6 |
| | 6 | 6465-6545 | 2 |
| | 7 | 6625-6785 | 3 |
| | 8 | 6865-7025 | 3 |
| 802.11ax-HE160 | 5 | 6025-6345 | 3 |
| | 6 | 6505 | 1 |
| | 7 | 6665-6825 | 2 |
| | 8 | 6985 | 1 |

| Mode | Modulation | Data Rate (Mbps) |
|----------------|---|------------------|
| 802.11ax-HE20 | OFDMA (BPSK/ QPSK/ 16QAM/ 64QAM/ 256QAM/1024QAM) | Up to 287 |
| 802.11ax-HE40 | | Up to 574 |
| 802.11ax-HE80 | | Up to 1201 |
| 802.11ax-HE160 | | Up to 2402 |

| Channel List | | | | | | | | |
|---------------|----------------|-------------|------------|----------------|-------------|------------|----------------|-------------|
| 802.11ax-HE20 | | | | | | | | |
| U-NII Band | Channel Number | Freq. (MHz) | U-NII Band | Channel Number | Freq. (MHz) | U-NII Band | Channel Number | Freq. (MHz) |
| 5 | 2 | 5955 | 5 | 81 | 6335 | 7 | 161 | 6755 |
| | 5 | 5975 | | 85 | 6375 | | 165 | 6775 |
| | 9 | 5995 | | 89 | 6395 | | 169 | 6795 |
| | 13 | 6015 | | 93 | 6415 | | 173 | 6815 |
| | 17 | 6035 | 6 | 97 | 6435 | 8 | 177 | 6835 |
| | 21 | 6055 | | 101 | 6455 | | 181 | 6855 |
| | 25 | 6075 | | 105 | 6475 | | 185 | 6875 |
| | 29 | 6095 | | 109 | 6495 | | 189 | 6895 |
| | 33 | 6115 | 7 | 113 | 6515 | 8 | 193 | 6915 |
| | 37 | 6135 | | 117 | 6535 | | 197 | 6935 |
| | 41 | 6155 | | 121 | 6555 | | 201 | 6955 |
| | 45 | 6175 | | 125 | 6575 | | 205 | 6975 |
| | 49 | 6195 | | 129 | 6595 | | 209 | 6995 |
| | 53 | 6215 | | 133 | 6615 | | 213 | 7015 |
| | 57 | 6235 | | 137 | 6635 | | 217 | 7035 |
| | 61 | 6255 | | 141 | 6655 | | 221 | 7055 |
| | 65 | 6275 | 145 | 6675 | 225 | 7075 | | |
| | 69 | 6295 | 149 | 6695 | 229 | 7095 | | |
| | 73 | 6315 | 153 | 6715 | 233 | 7115 | | |
| | 77 | 6335 | 157 | 6735 | | | | |

| Channel List | | | | | | | | |
|---------------|----------------|-------------|------------|----------------|-------------|------------|----------------|-------------|
| 802.11ax-HE40 | | | | | | | | |
| U-NII Band | Channel Number | Freq. (MHz) | U-NII Band | Channel Number | Freq. (MHz) | U-NII Band | Channel Number | Freq. (MHz) |
| 5 | 3 | 5965 | 5 | 83 | 6365 | 7 | 163 | 6765 |
| | 11 | 6005 | | 91 | 6405 | | 171 | 6805 |
| | 19 | 6045 | 6 | 99 | 6445 | 8 | 179 | 6845 |
| | 27 | 6085 | | 107 | 6485 | | 187 | 6885 |
| | 35 | 6125 | 7 | 115 | 6525 | 8 | 195 | 6925 |
| | 43 | 6165 | | 123 | 6565 | | 203 | 6965 |
| | 51 | 6205 | | 131 | 6505 | | 211 | 7005 |
| | 59 | 6245 | | 139 | 6645 | | 219 | 7045 |
| | 67 | 6285 | | 147 | 6685 | | 227 | 7085 |
| | 75 | 6325 | | 155 | 6725 | | | |

| Channel List | | | | | | | | |
|---------------|----------------|-------------|------------|----------------|-------------|------------|----------------|-------------|
| 802.11ax-HE80 | | | | | | | | |
| U-NII Band | Channel Number | Freq. (MHz) | U-NII Band | Channel Number | Freq. (MHz) | U-NII Band | Channel Number | Freq. (MHz) |
| 5 | 7 | 5985 | 5 | 87 | 6385 | 7 | 167 | 6785 |
| | 23 | 6065 | 6 | 103 | 6465 | 8 | 183 | 6865 |
| | 39 | 6145 | | 119 | 6545 | | 199 | 6945 |
| | 55 | 6225 | 7 | 135 | 6625 | | 215 | 7025 |
| | 71 | 6305 | | 151 | 6705 | | | |

| Channel List | | | | | |
|----------------|----------------|-----------------|------------|----------------|-----------------|
| 802.11ax-HE160 | | | | | |
| U-NII Band | Channel Number | Frequency (MHz) | U-NII Band | Channel Number | Frequency (MHz) |
| 5 | 15 | 6025 | 7 | 143 | 6665 |
| | 47 | 6185 | 8 | 175 | 6825 |
| | 79 | 6345 | | 207 | 6985 |
| 6 | 111 | 6505 | | | |

Note: Test modes are presented at section 3.7.

3.7. Description of Key Components

3.7.1. For the All Component Lists

| Item | Supplier | Model / Type | Character |
|--------------------------|------------|---------------------------|--|
| System | Microsoft | Win 10 | --- |
| | | Win 10 Pro | --- |
| | | Win11 Home | --- |
| Main Board | LG | ROYAL NVIDIA MAIN B/D PCB | Main Board (PM) Manufacturer: #1 Hannstar Board Tech (Jiang Yin) Corp.,Ltd. #2 Elec&Eltek Company (MCO) Limited. |
| | | ROYAL MAIN B/D PCB | Main Board (GM) Manufacturer: #1 Hannstar Board Tech (Jiang Yin) Corp.,Ltd. #2 Elec&Eltek Company (MCO) Limited. |
| WLAN SUB Board | LG | 17Z90R SUB B/D | Manufacturer: #1 Hannstar Board Tech (Jiang Yin) Corp.,Ltd. #2 JiangSuHuaShen Electronic co.,ltd (HXF) #3 Elec&Eltek Company (MCO) Limited. |
| CPU (Socket: BGA1744) | Intel | i7-1360P | 2.2GHz |
| | Intel | i5-1340P | 1.9GHz |
| | Intel | i7-1370P | 1.9GHz |
| | Intel | i5-1350P | 1.9GHz |
| 17" LCD Panel | LG Display | LP170WQ1-SPF2 | Resolution: 2560 x 1600, 60Hz WQXGA IPS #1 Without Touch #2 With Touch |
| | | LP170WQ2-SPB1 | Resolution: 2560 x 1600, 144Hz WQXGA IPS |
| Storage (SSD) | SK hynix | --- | 2TB |
| | | --- | 1TB |
| | | --- | 512GB |
| | | --- | 256GB |
| | Samsung | --- | 2TB |
| | | --- | 1TB |
| | | --- | 512GB |
| | | --- | 256GB |
| Memory (RAM) | Samsung | --- | 32GB LPDDR4x(On Board) |
| | | --- | 16GB LPDDR4x(On Board) |
| | SK Hynix | --- | 32GB LPDDR4x(On Board) |
| | | --- | 16GB LPDDR4x(On Board) |
| Battery Pack | LG | LBV122CM | DC7.76V, 90Wh Typ 11600 mAh |
| | LG | LBV7227E | DC7.74V, 80Wh Typ 10336 mAh |
| WLAN Combo Card | Intel | AX211D2W | WLAN and BT, 2x2 PCIe M.2 1216 SD adapter card FCC ID: PD9AX211D2 IC: 1000M-AX211D2 |

| Item | Supplier | Model / Type | Character |
|--|------------------------------------|------------------------------|---|
| WLAN Combo Antenna | LG (INPAQ) | WA-P-LELE-04-011 | PCB, Mono-pole Type Main: Black, Aux: Gray |
| | LG (INPAQ) | WA-P-LBLB-04-108* | PCB, Mono-pole Type Main: Black, Aux: Gray |
| | LG (LUXSHARE-ICT) | L1LRF009-CS-H | PCB, Mono-pole Type Main: Black, Aux: Gray |
| Touch Pad | LITE-ON | SP8001(SG-A0630-00A) | --- |
| | ELAN | SD081A-36H0 | --- |
| Keyboard | TIC | KT0120B9 | --- |
| | LITE ON | SN8B02 | --- |
| Web Camera | Chicony | CKFLF26 | --- |
| | Luxvisions | 1BF225N3 | --- |
| LAN Gender (Type C to LAN) | SUZHOU MEC ELECTRONICS | 80-5946-111 | (White) 10/100Megabit Ethernet |
| | | 80-5946-101 | (Black) 10/100 Megabit Ethernet |
| | ARIN TECH CO. LTD | GD-08MF-36-WH-LP10 | (White) 10/100Megabit Ethernet |
| | | GD-08MF-36-BK-LP11 | (Black) 10/100 Megabit Ethernet |
| | HUIZHOU DEHONG TECHNOLOGY CO.,LTD. | 370-50713 | (White) 10/100Megabit Ethernet |
| | | 370-50714 | (Black) 10/100 Megabit Ethernet |
| Type C to LAN: Shielded, Undetached, 0.12m | | | |
| AC Adapter | LG (PI ELECTRONICS) | LP65WFC20P-NJ W | (White) I/P: AC 100-240V, 1.6A, 50-60Hz O/P:DC5V,3A(15W) or DC9V, 3A(27W)or 15V,3A (15W) or 20V,3.25A (65W) Wall-Mounted: (2C) |
| | LG (PI ELECTRONICS) | LP65WFC20P-NJ B | (Black) I/P: AC 100-240V, 1.6A, 50-60Hz O/P:DC5V,3A(15W) or DC9V, 3A(27W)or 15V,3A (15W) or 20V,3.25A (65W) Wall-Mounted: (2C) |
| Type C Cable | LG (LUXSHARE-ICT) | Type C to C Data Cable ASS'Y | Shielded, Detached, 2.0m |

Note: “*” Standing for adding new configuration.

Remark: For more detailed features description, please refer to the manufacturer’s specifications or the user manual.

3.7.2. The EUT collocates with following worst components, which are used to establish a basic configuration of system during test:

| SKU (Mode) | | 1 |
|---------------------------|---|---|
| Main Board (GM) | LG, ROYAL MAIN B/D PCB | V |
| WLAN SUB Board | LG, 17Z90R SUB B/D | V |
| CPU | Intel, i7-1360P | V |
| 17” LCD Panel | LG Display, LP170WQ1-SPF2 with Touch | V |
| Storage (SSD) | Samsung, 2TB | V |
| | Samsung, 256GB | V |
| Memory (RAM) | Samsung, 32GB | V |
| Battery Pack | LG, 80Wh (for Main Board (GM)) | V |
| Touch Pad | LITE-ON | V |
| Keyboard | TIC | V |
| Web Camera | Chicony | V |
| WLAN Combo Card | Intel, AX211D2W | V |
| WLAN Combo Antenna | LG (INPAQ), WA-P-LBLB-04-108 | V |
| Type C #1 | AC Adapter LG(PI ELECTRONICS), LP65WGC20P-EK W | V |
| Type C #2 | Link to LAN Gender MEC (White) (10/100Mbps) | V |

3.8. Test Configuration

| Mode | T _{X_{on}} (ms) | 1/T _{X_{on}} (kHz) | T _{X_{on+off}} (ms) | Duty Cycle (x) | Duty Cycle Factor [10log(1/x)] (dB) |
|----------------|-------------------------------------|--|---|-------------------|--|
| 802.11ax-HE20 | 2.600 | 0.385 | 2.640 | 0.985 | N/A |
| 802.11ax-HE40 | 2.600 | 0.385 | 2.640 | 0.985 | N/A |
| 802.11ax-HE80 | 2.590 | 0.386 | 2.630 | 0.985 | N/A |
| 802.11ax-HE160 | 2.420 | 0.413 | 2.470 | 0.980 | N/A |
| 26T | 0.760 | 1.316 | 0.800 | 0.950 | 0.223 |
| 52T | 1.460 | 0.685 | 1.500 | 0.973 | 0.119 |
| 106T | 3.030 | 0.330 | 3.080 | 0.984 | N/A |
| 242T | 1.410 | 0.709 | 1.460 | 0.966 | 0.150 |
| 484T | 2.780 | 0.360 | 2.830 | 0.982 | N/A |
| 996T | 1.330 | 0.752 | 1.380 | 0.964 | 0.159 |

Note: When duty cycle is less than 98% (0.98) that duty cycle factor 10log(1/x) is needed to add in conducted test items measured in average detector.

| Mode | TX _{on} (ms) | T _{on} +T _{off} (ms) |
|----------------|-----------------------|--|
| 802.11ax-HE20 | | |
| 802.11ax-HE40 | | |
| 802.11ax-HE80 | | |
| 802.11ax-HE160 | | |

| Mode | TX _{on} (ms) | T _{on} +T _{off} (ms) |
|------|-----------------------|--|
| 26T | | |
| 52T | | |
| 106T | | |
| 242T | | |



| AC Conduction | |
|------------------|--|
| Normal operation | |

| Item | Mode | Data Rate | Test Channel |
|--------------------|---|----------------|--------------|
| Radiated Test Case | Radiated Spurious Emission (30MHz~1GHz) | 802.11ax-HE160 | HE0 15 |
| | Radiated Spurious Emission (Above 1GHz) (SPOT CHECK For U-NII Band 6 ~ 8 Original Report Worse Mode) | 802.11ax-HE40 | HE0 227 |

● OFDM Modulation

| Item | Mode | Data Rate | Test Channel |
|--------------------|--|----------------|---------------|
| Radiated Test Case | Radiated Spurious Emission (Above 1GHz) (Full Test) | 802.11ax-HE20 | HE0 2 |
| | | 802.11ax-HE40 | HE0 3 |
| | | 802.11ax-HE80 | HE0 87 |
| | | 802.11ax-HE160 | HE0 79 |
| | Radiated Band Edge <small>Note 1</small> | 802.11ax-HE20 | HE0 2/233 |
| | | 802.11ax-HE40 | HE0 3/227 |
| | | 802.11ax-HE80 | HE0 7/215 |
| | | 802.11ax-HE160 | HE0 15/207 |
| | | 802.11ax-HE20 | HE0 2/233 |
| | | 802.11ax-HE40 | HE0 3/227 |
| | | 802.11ax-HE80 | HE0 7/215 |
| | | 802.11ax-HE160 | HE0 15/207 |
| | | 802.11ax-HE20 | HE0 2/233 |
| | | 802.11ax-HE40 | HE0 3/227 |
| 802.11ax-HE80 | HE0 7/215 | | |
| 802.11ax-HE160 | HE0 15/207 | | |
| 802.11ax-HE20 | HE0 2/233 | | |

● OFDMA Modulation

| Item | Tones | RU Index | Mode | Data Rate | Test Channel |
|--------------------|--|----------|------|----------------|--------------|
| Radiated Test Case | Radiated Spurious Emission (Above 1GHz) (Full Test) | 26T | 18 | 802.11ax-HE80 | HE0 7 |
| | | 52T | 44 | 802.11ax-HE80 | HE0 7 |
| | | 106T | 56 | 802.11ax-HE80 | HE0 7 |
| | | 242T | 62 | 802.11ax-HE80 | HE0 23 |
| | | 484T | 65 | 802.11ax-HE40 | HE0 3 |
| | | 996T | 67 | 802.11ax-HE160 | HE0 79 |
| | Band Edge <small>Note 5</small> | 26T | 0 | 802.11ax-HE20 | HE0 2 |
| | | | 8 | 802.11ax-HE20 | HE0 233 |
| | | | 0 | 802.11ax-HE80 | HE0 7 |
| | | 52T | 37 | 802.11ax-HE20 | HE0 2 |
| | | | 40 | 802.11ax-HE20 | HE0 233 |
| | | | 44 | 802.11ax-HE40 | HE0 227 |
| | | 106T | 53 | 802.11ax-HE20 | HE0 2 |
| | | | 54 | 802.11ax-HE20 | HE0 233 |
| | | | 56 | 802.11ax-HE40 | HE0 227 |
| | | 242T | 61 | 802.11ax-HE20 | HE0 2 |
| | | | 61 | 802.11ax-HE20 | HE0 233 |
| | | | 61 | 802.11ax-HE80 | HE0 7 |
| | | 484T | 62 | 802.11ax-HE40 | HE0 227 |
| | | | 65 | 802.11ax-HE40 | HE0 3 |
| | | 996T | 65 | 802.11ax-HE40 | HE0 227 |
| | | | 67 | 802.11ax-HE80 | HE0 215 |
| | | | 67 | 802.11ax-HE160 | HE0 15 |

● OFDM Modulation

| Item | | Mode | Data Rate | Test Channel |
|---------------------|---|----------------|-----------|--|
| Conducted Test Case | Maximum Conducted Output power (SPOT Check) | 802.11ax-HE20 | HE0 | 2/45/93/97/105/113/117/149/181/185/209/233 |
| | | 802.11ax-HE40 | HE0 | 3/43/91/99/107/115/147/179/187/211/227 |
| | | 802.11ax-HE80 | HE0 | 7/39/87/103/119/135/151/167/183/199/215 |
| | | 802.11ax-HE160 | HE0 | 15/47/79/111/143/175/207 |
| | Contention Based Protocol | 802.11ax-HE20 | HE0 | 45/105/149/209 |
| | | 802.11ax-HE160 | HE0 | 47/111/143/207 |

● OFDMA Modulation

| Item | | Tones | RU Index | Mode | Data Rate | Test Channel |
|---------------------|---|-------|-------------------------|----------------|-----------|--|
| Conducted Test Case | Maximum Conducted Output power (SPOT Check) | 26T | 0/4/8 | 802.11ax-HE20 | HE0 | 2/45/93/97/105/113/117/149/181/185/209/233 |
| | | 52T | 37/39/40 | | | |
| | | 106T | 53/54 | | | |
| | | 242T | 61 | | | |
| | | 26T | 0/8/17 | 802.11ax-HE40 | HE0 | 3/43/91/99/107/115/147/179/187/211/227 |
| | | 52T | 37/40/44 | | | |
| | | 106T | 53/54/56 | | | |
| | | 242T | 61/62 | | | |
| | | 484T | 65 | 802.11ax-HE80 | HE0 | 7/39/87/103/119/135/151/167/183/199/215 |
| | | 26T | 0/18/36 | | | |
| | | 52T | 37/44/52 | | | |
| | | 106T | 53/56/60 | | | |
| | | 242T | 61/62/64 | 802.11ax-HE160 | HE0 | 15/47/79/111/143/175/207 |
| | | 484T | 65/66 | | | |
| | | 996T | 67 | | | |
| | | 26T | 0/18/36 S0/S18/S36 | | | |
| | | 52T | 37/44/52 S37/S44/S52 | 802.11ax-HE160 | HE0 | 15/47/79/111/143/175/207 |
| | | 106T | 53/56/60 S53/S56/S60 | | | |
| | | 242T | 61/62/64 S61/S62/S64 | | | |
| | | 484T | 65/66 S65/S66 | | | |
| 996T | 65/S67 | | | | | |

Note 1: Mobile Device Portable Device,

and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow: Lie Side Stand

Note 2: Low, mid, and high channels were measured, only the worst channel of each modulation was presented in this report.

Note 3: The data rates were selected based on preliminary testing that identified rate as the worst case for output power.

Note 4: After preliminary test, we present worst case with maximum power of each RU type.

Note 5: We present worst case (max. power, closest band-edge channel or both) in the report.

3.9. Output Power Setting

| Mode | U-NII Band | Centre Frequency (MHz) | Power Setting | | Mode | U-NII Band | Centre Frequency (MHz) | Power Setting | |
|---------------|------------|------------------------|---------------|-------|---------------|------------|------------------------|---------------|--------|
| | | | AUX | Main | | | | AUX | Main |
| 802.11ax-HE20 | 5 | 5955 | 1.500 | 1.500 | 802.11ax-HE20 | 7 | 6535 | 0.750 | 0.750 |
| | | 6175 | 1.500 | 1.500 | | | 6695 | 0.750 | 0.750 |
| | | 6415 | 1.500 | 1.500 | | | 6855 | 0.750 | 0.750 |
| | 6 | 6435 | 1.500 | 1.500 | | 8 | 6875 | 0.750 | 0.750 |
| | | 6475 | 1.500 | 1.500 | | | 6995 | 0.750 | 0.750 |
| | | 6515 | 1.500 | 1.500 | | | 7115 | -3.000 | -3.000 |

| Mode | U-NII Band | Centre Frequency (MHz) | Power Setting | | Mode | U-NII Band | Centre Frequency (MHz) | Power Setting | |
|---------------|------------|------------------------|---------------|-------|--------------|------------|------------------------|---------------|-------|
| | | | AUX | Main | | | | AUX | Main |
| 802.11ax-HE40 | 5 | 5965 | 4.750 | 4.750 | 802.11ax-HE0 | 7 | 6525 | 4.750 | 4.750 |
| | | 6165 | 4.750 | 4.750 | | | 6685 | 4.000 | 4.000 |
| | | 6405 | 4.750 | 4.750 | | | 6845 | 4.000 | 4.000 |
| | 6 | 6445 | 4.750 | 4.750 | | 8 | 6885 | 4.000 | 4.000 |
| | | 6485 | 4.750 | 4.750 | | | 7005 | 4.000 | 4.000 |
| | | | | | | | 7085 | 4.500 | 4.500 |

| Mode | U-NII Band | Centre Frequency (MHz) | Power Setting | | Mode | U-NII Band | Centre Frequency (MHz) | Power Setting | |
|---------------|------------|------------------------|---------------|-------|---------------|------------|------------------------|---------------|-------|
| | | | AUX | Main | | | | AUX | Main |
| 802.11ax-HE80 | 5 | 5985 | 7.250 | 7.250 | 802.11ax-HE80 | 7 | 6625 | 6.500 | 6.500 |
| | | 6145 | 7.250 | 7.250 | | | 6705 | 6.500 | 6.500 |
| | | 6385 | 7.250 | 7.250 | | | 6785 | 6.500 | 6.500 |
| | 6 | 6465 | 7.250 | 7.250 | | 8 | 6865 | 6.500 | 6.500 |
| | | 6545 | 7.250 | 7.250 | | | 6945 | 6.500 | 6.500 |
| | | | | | | | 7025 | 6.500 | 6.500 |

| Mode | U-NII Band | Centre Frequency (MHz) | Power Setting | | Mode | U-NII Band | Centre Frequency (MHz) | Power Setting | |
|----------------|------------|------------------------|---------------|--------|----------------|------------|------------------------|---------------|-------|
| | | | AUX | Main | | | | AUX | Main |
| 802.11ax-HE160 | 5 | 6025 | 10.000 | 10.000 | 802.11ax-HE160 | 7 | 6665 | 9.250 | 9.250 |
| | | 6185 | 10.000 | 10.000 | | | 6825 | 9.250 | 9.250 |
| | | 6345 | 10.000 | 10.000 | | 8 | 6985 | 9.250 | 9.250 |
| | 6 | 6505 | 10.000 | 10.000 | | | | | |

3.10. Tested Supporting System List

3.10.1. Support Peripheral Unit

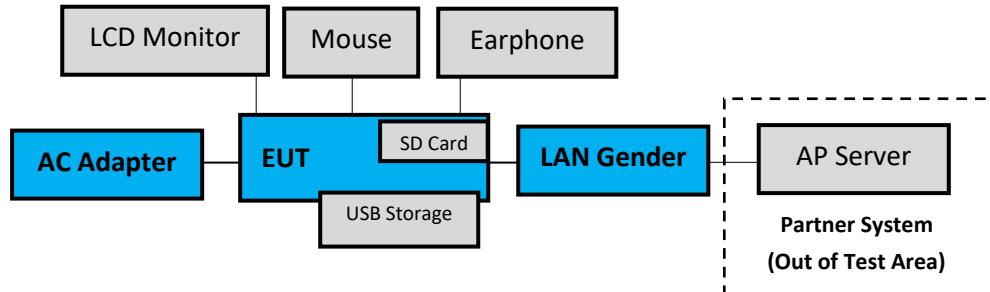
| No. | Product | Brand | Model No. | Serial No. | Approval |
|-----------------------|-------------|---------|----------------|------------------------------|--|
| 1. | LCD Monitor | DELL | P2418D | CN-0P7KK0-TV200-8B J-021T | N/A |
| 2. | USB Mouse | hp | MOFYUO | FCMHH0AKZBD7LC | N/A |
| 3. | Earphone | APPLE | N/A | N/A | N/A |
| 4. | SD Card | ADATA | MicroSDHC Card | N/A | N/A |
| 5. | USB Storage | SanDisk | SDCZ48-032G | N/A | N/A |
| Partner System | | | | | |
| 6 | AP Server | ASUS | RT-AX88U | N/A | FCC ID: MSQ-RTAXHP00 IC: 3568A-RTAXHP00 |

3.10.2. Cable Lists

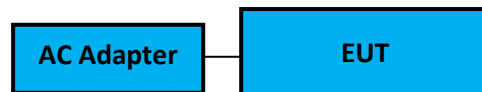
| No. | Cable Description Of The Above Support Units |
|-----|--|
| 1. | HDMI Cable: Shielded, Detachable, 1.8m AC Power Cord: Unshielded, Detachable, 1.8m |
| 2. | USB Cable: Unshielded, Undetachable, 1.8m |
| 3. | Earphone Cable: Unshielded, Undetachable, 1.2m |
| 4. | N/A |
| 5. | USB Cable: Unshielded, Undetachable, 1.8m |
| 6 | AC adapter: M/N:WA-30B12, Cable: Unshielded, Detachable, 1.2m LAN cable: Unshielded, Detachable, 3.0m |
| 7 | LAN cable: Unshielded, Detachable, 1.8m |

3.11. Setup Configuration

3.11.1. EUT Configuration for Power Line & Radiated Emission



3.11.2. EUT Configuration for RF Conducted Test Items



3.12. Operating Condition of EUT

Test program “DRTU” is used for enabling EUT WLAN function under continues transmitting and choosing data rate/ channel.

[ANT AUX port (A Button in DRTU), ANT Main port (B Button in DRTU)].

3.13. Description of Test Facility

| | |
|-------------------|--|
| Name of Test Firm | Audix Technology Corporation / EMC Department No. 491, Zhongfu Rd., Linkou Dist., New Taipei City 244, Taiwan Tel: +886-2-26092133 Fax: +886-2-26099303 Website : www.audixtech.com Contact e-mail: attemc_report@audixtech.com |
| Accreditations | The laboratory is accredited by following organizations under ISO/IEC 17025:2017 (1) NVLAP(USA) NVLAP Lab Code 200077-0 (2) TAF(Taiwan) No. 1724 |
| Test Facilities | FCC OET Designation Number under APEC MRA by NCC is : TW1724 ISED CAB Identifier Number under APEC TEL MRA by NCC is TW1724 (1) No.8 Shielded Room (2) No.1 3m Semi Anechoic Chamber |

3.14. Measurement Uncertainty

The measurement uncertainty levels have been estimated as specified in ETSI TR 100 028-2001

| Test Items/Facilities | | Frequency Range | Uncertainty | |
|----------------------------------|-------------------------------------|-------------------------------|--------------------------------|--------|
| Conduction Test | <input type="checkbox"/> | No. 7 Shielded Room | 9kHz-150kHz | ±3.7dB |
| | | | 150kHz-30MHz | ±3.4dB |
| | <input checked="" type="checkbox"/> | No. 8 Shielded Room | 9kHz-150kHz | ±3.7dB |
| | | | 150kHz-30MHz | ±3.5dB |
| Radiation Test | <input checked="" type="checkbox"/> | No.1 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal | ±3.6dB |
| | | | 200MHz-1000MHz, 3m, Horizontal | ±4.3dB |
| | | | 30MHz-200MHz, 3m, Vertical | ±4.4dB |
| | | | 200MHz-1000MHz, 3m, Vertical | ±4.8dB |
| | | | 1GHz-6GHz, 3m | ±4.8dB |
| | | | 6GHz-18GHz, 3m | ±4.5dB |
| | <input type="checkbox"/> | No.3 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal | ±4.0dB |
| | | | 200MHz-1000MHz, 3m, Horizontal | ±4.4dB |
| | | | 30MHz-200MHz, 3m, Vertical | ±4.7dB |
| | | | 200MHz-1000MHz, 3m, Vertical | ±4.5dB |
| | | | 1GHz-6GHz, 3m | ±4.8dB |
| | | | 6GHz-18GHz, 3m | ±4.5dB |
| | <input type="checkbox"/> | No.4 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal | ±4.3dB |
| | | | 200MHz-1000MHz, 3m, Horizontal | ±4.2dB |
| | | | 30MHz-200MHz, 3m, Vertical | ±4.8dB |
| | | | 200MHz-1000MHz, 3m, Vertical | ±4.7dB |
| | | | 1GHz-6GHz, 3m | ±4.6dB |
| | | | 6GHz-18GHz, 3m | ±4.4dB |
| | <input type="checkbox"/> | No.5 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal | ±4.6dB |
| | | | 200MHz-1000MHz, 3m, Horizontal | ±4.4dB |
| | | | 30MHz-200MHz, 3m, Vertical | ±4.5dB |
| | | | 200MHz-1000MHz, 3m, Vertical | ±4.9dB |
| | | | 1GHz-6GHz, 3m | ±4.9dB |
| | | | 6GHz-18GHz, 3m | ±4.6dB |
| Radiated emissions (18GHz-40GHz) | | 18GHz-40GHz, 3m | ±3.4dB | |

Remark : Uncertainty = $ku_c(y)$

| Test Items | Uncertainty |
|--------------------------------|-------------|
| Maximum Conducted Output Power | ± 0.72dB |
| Contention Based Protocol | ± 2% |

4. MEASUREMENT EQUIPMENT LIST

4.1. Conducted Emission Measurement

| Item | Type | Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Interval |
|------|----------------------------|--------------|-----------|------------|------------|---------------|
| 1. | Test Receiver | R&S | ESR3 | 101774 | 2023.01.11 | 1 Year |
| 2. | A.M.N. | R&S | ENV432 | 101567 | 2023.06.02 | 1 Year |
| 3. | L.I.S.N. | Kyoritsu | KNW-407 | 8-855-9 | 2022.12.19 | 1 Year |
| 4. | Pulse Limiter | R&S | ESH3-Z2 | 100354 | 2022.12.14 | 1 Year |
| 5. | Digital Thermo-Hygro Meter | iMax | HTC-1 | No.8 S/R | 2023.04.13 | 1 Year |
| 6. | Coaxial Cable | Yeida | RG/58AU | CE-08 | 2022.09.07 | 1 Year |
| 7. | Test Software | Audix | e3 | V9 18621a | N.C.R. | N.C.R. |

4.2. Radiated Emission Measurement

| Item | Type | Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Interval |
|------|----------------------------|--------------|------------------|-------------|------------|---------------|
| 1. | Spectrum Analyzer | Keysight | N9010B-526 | MY57410128 | 2022.12.21 | 1 Year |
| 2. | Test Receiver | R&S | ESCS30 | 100338 | 2023.06.20 | 1 Year |
| 3. | Amplifier | HP | 8447D | 2944A06305 | 2022.12.29 | 1 Year |
| 4. | Microwave Amplifier | Keysight | 83051A | MY56480113 | 2022.09.07 | 1 Year |
| 5. | Microwave Amplifier | HP | 8449B | 3008A01284 | 2023.06.06 | 1 Year |
| 6. | Loop Antenna | TESEQ | HLA 6121 | 60478 | 2023.02.21 | 1 Year |
| 7. | Bilog Antenna | TESEQ | CBL6112D | 33821 | 2022.07.01 | 1 Year |
| 8. | Horn Antenna | EMCO | 3115 | 9112-3775 | 2023.05.04 | 1 Year |
| 9. | Horn Antenna | COM-POWER | AH-840 | 101092 | 2022.12.30 | 1 Year |
| 10. | Notch Filter | Warison | WFIL-N5925-6425F | WR61CFWC4B1 | 2023.01.13 | 1 Year |
| 11. | Notch Filter | Warison | WFIL-N6425-6525F | WR61CFWC6B1 | 2023.01.13 | 1 Year |
| 12. | Notch Filter | Warison | WFIL-N6525-6875F | WR61CFWC8B1 | 2023.01.13 | 1 Year |
| 13. | Notch Filter | Warison | WFIL-N6875-7125F | WR61CFWC2B1 | 2023.01.13 | 1 Year |
| 14. | Coaxial Cable | MIYAZAKI | 5D2W | RE-11 | 2023.01.07 | 1 Year |
| 15. | Coaxial Cable | HUBER+SUHNER | SUCOFLEX 106 | RE-14 | 2023.01.07 | 1 Year |
| 16. | Coaxial Cable | HUBER+SUHNER | SUCOFLEX 102 | RE-30 | 2022.08.22 | 1 Year |
| 17. | Digital Thermo-Hygro Meter | iMax | HTC-1 | No.1 3m A/C | 2023.04.13 | 1 Year |
| 18. | Test Software | Audix | e3 | V9 18621a | N.C.R. | N.C.R. |

4.3. RF Conducted Measurement

| Item | Type | Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Interval |
|------|----------------------------|--------------|------------|------------|------------|---------------|
| 1. | Spectrum Analyzer | Keysight | N9020B-544 | MY57120357 | 2023.02.22 | 1 Year |
| 2. | Power Meter | Anritsu | ML2495A | 2127005 | 2022.12.01 | 1 Year |
| 3. | Power Meter | Anritsu | ML2495A | 2127004 | 2022.12.07 | 1 Year |
| 4. | Power Sensor | Anritsu | MA2411B | 1911360 | 2022.12.07 | 1 Year |
| 5. | Power Sensor | Anritsu | MA2411B | 1911356 | 2022.12.07 | 1 Year |
| 6. | Digital Thermo-Hygro Meter | iMax | HTC-1 | RF-03 | 2023.04.13 | 1 Year |

4.4. Contention Based Protocol Measurement

| Item | Type | Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Interval |
|------|--------------------------------|--------------|------------------|----------------|------------|---------------|
| 1. | Spectrum Analyzer | Keysight | N9030B | MY61330403 | 2022.12.16 | 1 Year |
| 2. | Spectrum Analyzer | Keysight | N9010B | MY59071380 | 2023.03.02 | 1 Year |
| 3. | MXG RF Vector Signal Generator | Agilent | N5182B | MY53050409 | 2022.11.14 | 1 Year |
| 4. | Frequency Extender | KEYSIGHT | N5182BX07 | MY59362533 | 2022.11.14 | 1 Year |
| 5. | Digital Thermo-Hygro Meter | iMax | HTC-1 | RF-03 | 2023.04.13 | 1 Year |
| 6. | Power Splitter | minicircuit | ZFRSC-183-S+ | SF688901703 | 2023.03.30 | 1 Year |
| 7. | Power Divider | EMEC | EM-MPD-0.5/8-2SS | 22072002-17 | 2023.03.30 | 1 Year |
| 8. | Attenuator (10dB) X2 | Worken | WK0602-10 | 0120A02208001S | N.C.R | N.C.R |
| 9. | Attenuator (30dB) X1 | Worken | WK0602-30 | 0120A02208002S | N.C.R | N.C.R |
| 10. | CBP Test Unit | KEYSIGHT | N/A | N/A | N.C.R. | N.C.R. |

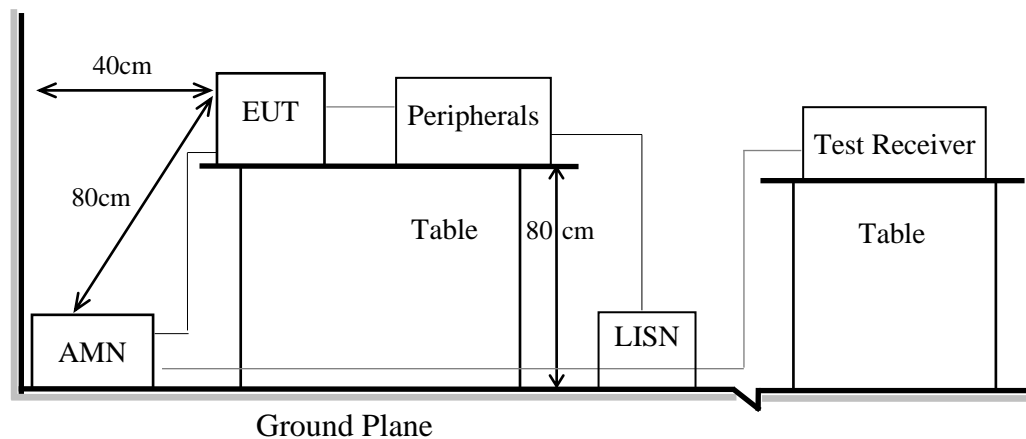
5. CONDUCTED EMISSION

5.1. Block Diagram of Test Setup

5.1.1. Block Diagram of EUT

Indicated as section 3.11

5.1.2. Shielded Room Setup Diagram



5.2. Conducted Emission Limit

| Frequency | Conducted Limit | |
|-----------------|--------------------|--------------------|
| | Quasi-Peak Level | Average Level |
| 150kHz ~ 500kHz | 66 ~ 56 dB μ V | 56 ~ 46 dB μ V |
| 500kHz ~ 5MHz | 56 dB μ V | 46 dB μ V |
| 5MHz ~ 30MHz | 60 dB μ V | 50 dB μ V |

Remark 1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.

2.: The lower limit applies to the band edges.

5.3. Test Procedure

- 5.3.1. To set up the EUT as indicated in ANSI C63.10. The EUT was placed on the table which has 80 cm height to the ground and 40 cm distance to the conducting wall.
- 5.3.2. Power supplier of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.).
- 5.3.3. The AC power supplies to all peripheral devices must be provided through line impedance stabilization network (L.I.S.N.)
- 5.3.4. Checking frequency range from 150 kHz to 30 MHz and record the emission which does not have 20 dB below limit.

5.4. Test Results

Please refer to Appendix A.

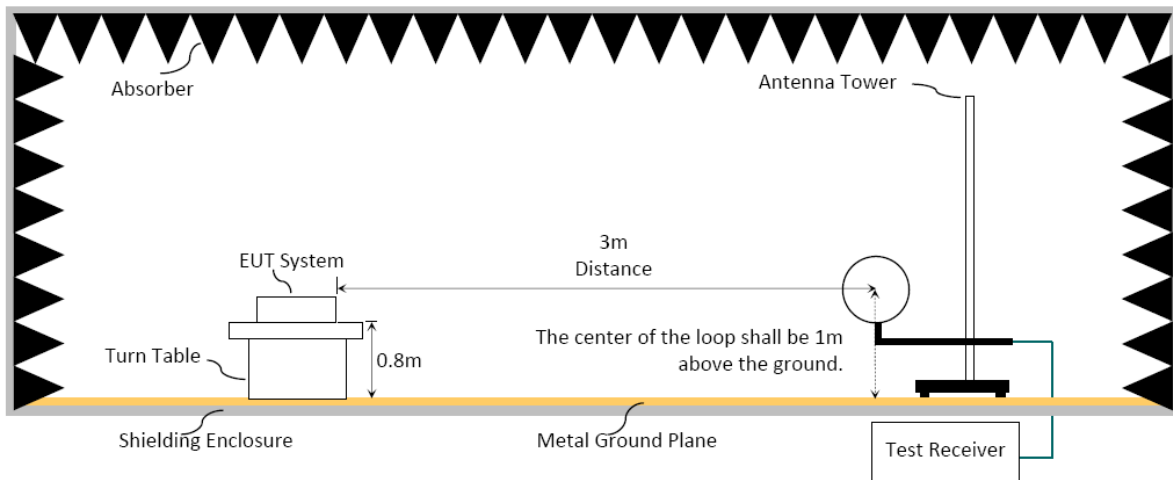
6. RADIATED EMISSION

6.1. Block Diagram of Test Setup

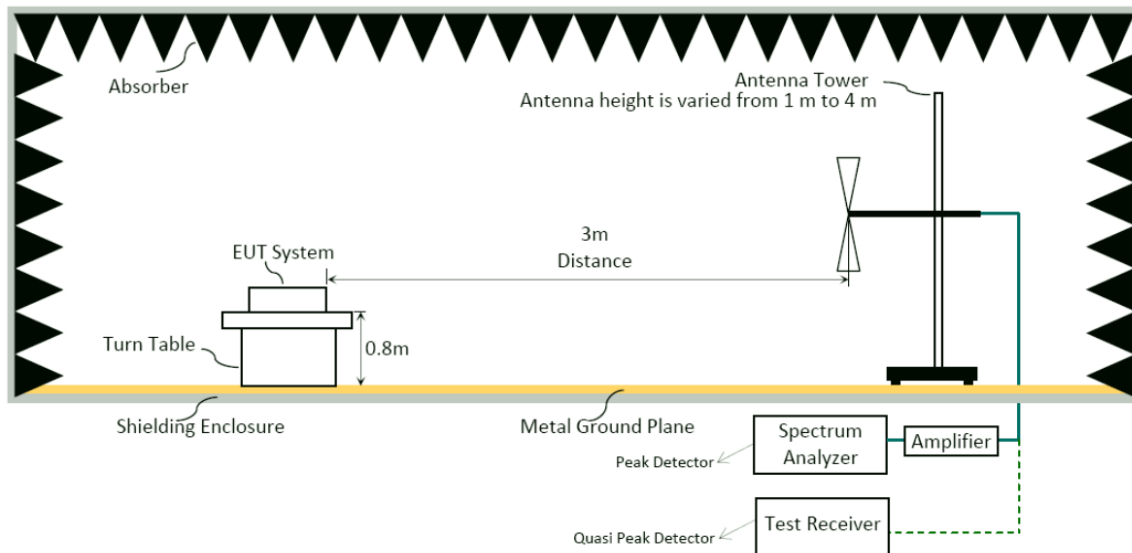
6.1.1. Block Diagram of EUT

Indicated as section 3.11

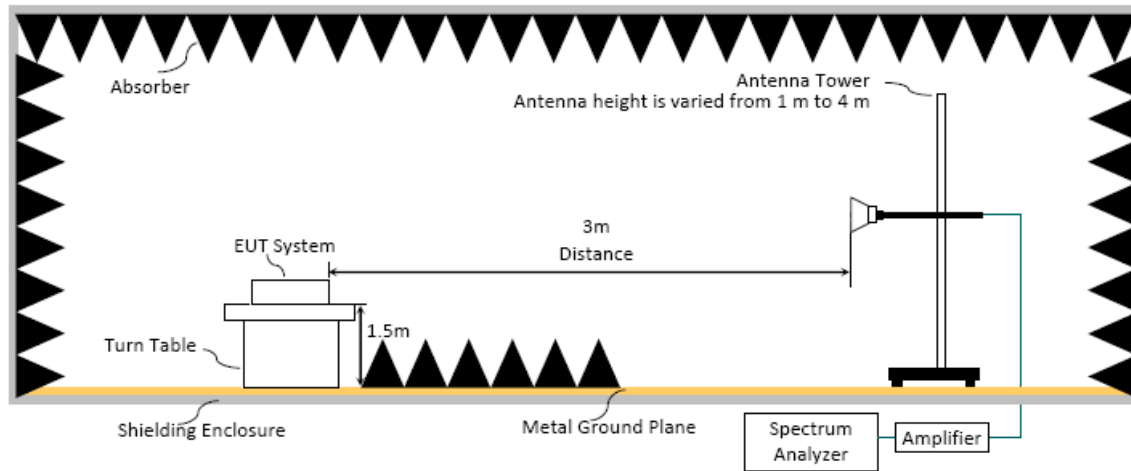
6.1.2. Setup Diagram for 9kHz-30MHz



6.1.3. Setup Diagram for 30-1000MHz



6.1.4. Setup Diagram for above 1GHz



6.2. Radiated Emission Limits

Radiated emissions fall in restricted bands, as defined in FCC Section 15.205/RSS-Gen Section 8.10 table 7 must be in compliance with the radiated emission limits specified in FCC Section 15.209/RSS-Gen Section 8.9 table 6 as below.

6.2.1. General Limit

| Frequency (MHz) | Distance(m) | Limits | |
|-----------------|-------------|---|-------------|
| | | dB μ V/m | μ V/m |
| 0.009 - 0.490 | 300 | 67.6-20 log f(kHz) | 2400/f kHz |
| 0.490 - 1.705 | 30 | 87.6-20 log f(kHz) | 24000/f kHz |
| 1.705 - 30 | 30 | 29.5 | 30 |
| 30 - 88 | 3 | 40.0 | 100 |
| 88- 216 | 3 | 43.5 | 150 |
| 216- 960 | 3 | 46.0 | 200 |
| Above 960 | 3 | 54.0 | 500 |
| Above 1000 | 3 | 74.0 dB μ V/m (Peak) 54.0 dB μ V/m (Average) | |

Remark : (1) dB μ V/m = 20 log (μ V/m)

(2) The tighter limit applies to the edge between two frequency bands.

(3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

(4) Fundamental and emission fall within operation band are exempted from this section.

(5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

6.2.2. Limit for non-restricted frequency above 1 GHz

| Frequency Band (MHz) | E.I.R.P. Limit | Field Strength Limit at 3 m |
|----------------------|----------------|-----------------------------|
| Out of 5925 to 7125 | -27 dBm/MHz | 68.2 dB μ V/m |

Note: Field Strength at 3 m = E.I.R.P. + 95.2 dB

6.3. Test Procedure

Frequency Range 9kHz~30MHz:

The EUT setup on the turntable which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

- (1) RBW = 9kHz with peak and average detector.
- (2) Detector: average and peak (9kHz-490kHz)
Q.P. (490kHz-30MHz)

Frequency Range 30MHz ~ 40GHz:

The EUT setup on the turn table which has 80cm (for 30-1000MHz) and 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

6.3.1. Radiated measurement Spectrum Analyzer Setting

6.3.1.1 Frequency below 1GHz:

Spectrum Analyzer is used for pre-testing with following setting:

- (1) RBW = 120kHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.

Note 1: When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required, otherwise using Q.P. for final measurement.

Note 2: When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

6.3.1.2 Frequency above 1GHz to 10th harmonic (up to 40 GHz):

Peak Detector:

- (1) RBW = 1MHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.

Note: When peak-detected value is lower than limit that the measurement using the average detector is not required, otherwise using average detector for final measurement.

Average Detector:**■ Option 1:**

(1) RBW = 1MHz

(2) VBW $\geq 1/T$. (Duty Cycle < 98%, when duty cycle presented in section 3.8)

| Mode | VBW Setting |
|------|-------------|
| 26T | 1.5kHz |
| 52T | 750Hz |
| 242T | 750Hz |
| 996T | 820Hz |

(3) VBW = set VBW \leq RBW / 100, but not less than 10Hz (Duty Cycle \geq 98%, when duty cycle presented in section 3.7)

| Mode | VBW Setting |
|----------------|-------------|
| 802.11ax-HE20 | 10Hz |
| 802.11ax-HE40 | 10Hz |
| 802.11ax-HE80 | 10Hz |
| 802.11ax-HE160 | 10Hz |
| 106T | 10Hz |
| 484T | 10Hz |

(4) Detector = Peak.

(5) Sweep time = auto.

(6) Trace mode = max hold.

(7) Allow sweeps to continue until the trace stabilizes.

□ Option 2:

Average Emission Level = Peak Emission Level + D.C.C.F.

6.3.2. Radiated band edge measurement Spectrum Analyzer Setting

For without 99% OBW edge within 2 MHz of the authorized band edge:

The spectrum analyzer setting, please refer to section 6.3.1.2

For with 99% OBW edge within 2 MHz of the authorized band edge:

Per KDB 789033 Section G.3.d and ANSI C63.10 -2013 6.10.4, SA setting as below:

a. Fundamental field strength of SA setting:

The spectrum analyzer setting, please refer to section 6.3.1.2

b. Delta of SA setting:

- (1) RBW = 1% SPAN but no less than 30 KHz
(In this case, RBW = 500 KHz)
- (2) VBW \geq 3 x RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.

Correction Factor (Via delta, dB) = Fundamental Emission Level (dB μ V/m) @ RBW 500KHz - Band Edge Emission Level (dB μ V/m) @ RBW 500kHz

Band Edge Emission Level (dB μ V/m) =
Fundamental Emission Level (dB μ V/m) @ RBW 1MHz - Marker Delta (dB)

6.4. Measurement Result Explanation

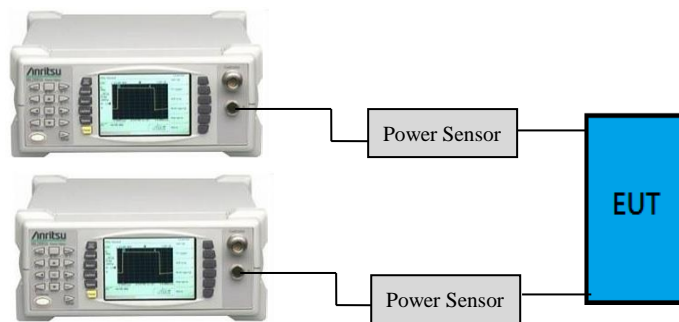
- Peak Emission Level (dB μ V/m) = Antenna Factor (dB/m) + Cable Loss (dB) + Meter Reading (dB μ V) (including Preamp factor if test used)
- Average Emission Level (dB μ V/m) = Antenna Factor (dB/m) + Cable Loss (dB) + Meter Reading (dB μ V) (including Preamp factor if test used)
- Average Emission Level (dB μ V/m) = Peak Emission Level (dB μ V/m) + DCCF (dB)
Duty Cycle Correction Factor (DCCF) = $20\log(\text{TX}_{\text{on}}/\text{TX}_{\text{on+off}})$ presented in section 3.8.
- ERP = Peak Emission Level (dB μ V/m) - 95.2dB - 2.14dB
- Band Edge Emission Level (dB μ V/m) = Fundamental Emission Level (dB μ V/m) - Marker-Delta (dB)

6.5. Test Results

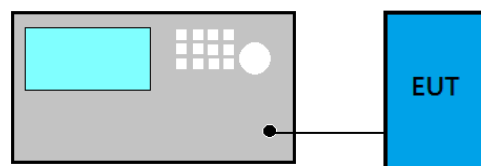
Please refer to Appendix A.

7. MAXIMUM CONDUCTED OUTPUT POWER

7.1. Block Diagram of Test Setup



- For 802.11ac-VHT80/160, 802.11ax-HE160 modes only



7.2. Specification Limits

For client devices operating under the control of an indoor access point in the 5.925-7.125 GHz bands, the maximum e.i.r.p. over the frequency band of operation must not exceed 24 dBm.

7.3. Test Procedure

Following measurement procedure is reference to KDB 789033 D02 General UNII Test Procedures New Rules v02r01:

■ **Method AVGPM (Measurement using an RF average power meter):**

EUT is connected to power sensor and record the maximum average output power and duty cycle factor is added when duty cycle presented in section 3.7 is < 98%.

■ **Method AVGSA-2 (Spectrum channel power) for 802.11ac-VHT80/160, 802.11ax-HE80/160 modes only**

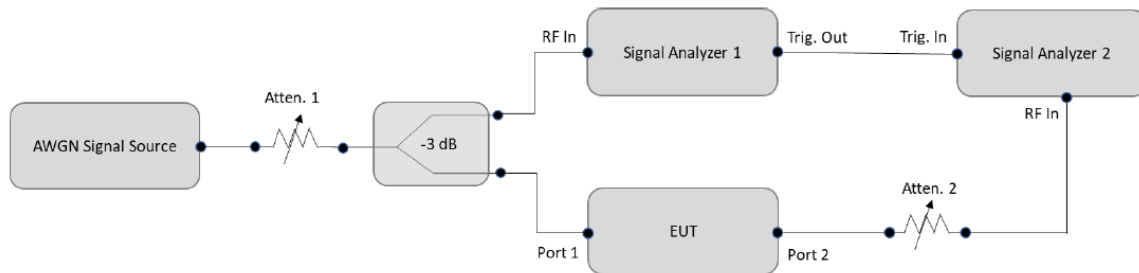
- (1) Set span to at least 1.5 times the OBW
- (2) Set RBW = 1 MHz
- (3) Set the video bandwidth (VBW) \geq 3 MHz.
- (4) Detector = RMS.
- (5) Trace mode = trace average at least 100 traces
- (6) Sweep = auto couple.
- (7) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges.
- (8) Duty cycle factor is added when duty cycle presented in section 3.8 is < 98%.

7.4. Test Results

Please refer to Appendix A

8. CONTENTION BASED PROTOCOL

8.1. Block Diagram of Test Setup



8.2. Specification Limits

Indoor access points, subordinate devices and client devices operating in the 5.925-7.125 GHz band must employ a contention-based protocol

FCC KDB 987594 D02 U-NII 6GHz EMC Measurement v01v01

Unlicensed low-power indoor devices must detect co-channel radio frequency power that is at least -62 dBm or lower. Upon detection of energy in the band, unlicensed low power indoor devices must vacate the channel (in which incumbent signal is transmitted) and stay off the incumbent channel as long as detected radio frequency power is equal to or greater than the threshold (-62 dBm)¹. The -62 dBm (or lower) threshold is referenced to a 0 dBi antenna gain

To ensure incumbent operations are reliably detected in the band, low power indoor devices must detect RF energy throughout their intended operating channel. For example, an 802.11 device that plans to transmit a 40 MHz- wide signal (on a primary 20 MHz channel and a secondary 20 MHz channel) must detect energy throughout the entire 40 MHz channel. Additionally, low-power indoor devices must detect co-channel energy with 90% or greater certainty.

Table 1. Criteria to determine number of times detection threshold test may be performed

| If | Number of Tests | Placement of Incumbent Transmission |
|---------------------------------------|--|--|
| $BW_{EUT} \leq BW_{Inc}$ | One | Tune incumbent and EUT transmission ($f_{c1} = f_{c2}$) |
| $BW_{Inc} < BW_{EUT} \leq 2BW_{Inc}$ | One | Incumbent transmission is contained within BW_{EUT} |
| $2BW_{Inc} < BW_{EUT} \leq 4BW_{Inc}$ | Twice. Incumbent transmission is contained within BW_{EUT} | Incumbent transmission is located as closely as possible to the lower edge and upper edge, respectively, of the EUT channel |
| $BW_{EUT} > 4BW_{Inc}$ | Three times | Incumbent transmission is located as closely as possible to the lower edge of the EUT channel, in the middle of EUT channel, and as closely as possible to the upper edge of the EUT channel |

Where:

BW_{EUT} : Transmission bandwidth of EUT signal

BW_{Inc} : Transmission bandwidth of the simulated incumbent signal (10 MHz wide AWGN signal)

f_{c1} : Center frequency of EUT transmission

f_{c2} : Center frequency of simulated incumbent signal

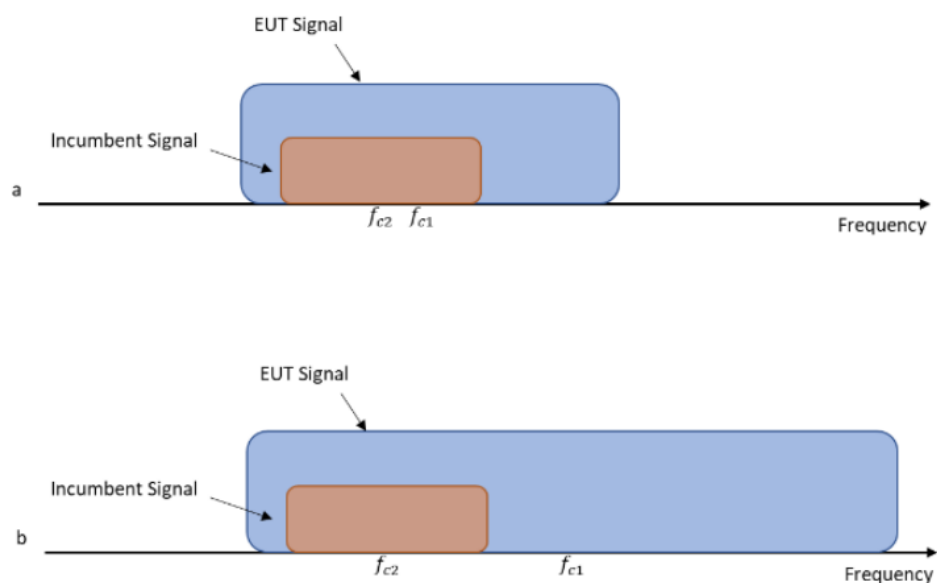


Figure 1. Two possible scenarios where a) center frequency of EUT transmission falls within incumbent's bandwidth, or b) outside of it

8.3. Test Procedure

Following measurement procedure is reference to KDB 987594 D02 U-NII 6GHz EMC Measurement v01v01:

- (1) To ensure EUT reliably detects an incumbent signal in both scenarios shown in Figure 1, the detection threshold test may be repeated more than once with the incumbent signal (having center frequency f_{c2}) tuned to different center frequencies within the EUT transmission bandwidth. The criteria specified in Table 1 determines how many times the detection threshold test must be performed
- (2) Using an AWGN signal source, generate (but do not transmit, i.e., RF OFF) a 10 MHz-wide AWGN signal. Use Table 1 to determine the center frequency of the 10 MHz AWGN signal relative to the EUT's channel bandwidth and center frequency.
- (3) Monitor the signal analyzer to verify if the AWGN signal has been detected and the EUT has ceased transmission. If the EUT continues to transmit, then incrementally increase the AWGN signal power level until the EUT stops transmitting.
- (4) (Including all losses in the RF paths) Determine and record the AWGN signal power level (at the EUT's antenna port) at which the EUT ceased transmission. Repeat the procedure at least 10 times to verify the EUT can detect an AWGN signal with 90% (or better) level of certainty.
- (5) Refer to Table 1 to determine number of times the detection threshold testing needs to be repeated. If testing is required more than once, then go back to step 2, choose a different center frequency for the AWGN signal and repeat the process.
- (6) The test tool is "LAN test" to let the EUT to transmit with a constant duty cycle.

8.4. Test Results

Please refer to Appendix A



Audix Technology Corp.
No. 491, Zhongfu Rd., Linkou Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

9. DEVIATION TO TEST SPECIFICATIONS

【NONE】



APPENDIX A

TEST DATA AND PLOTS

(Model: 17Z90R)



*Audix Technology Corp.
No. 491, Zhongfu Rd., Linkou Dist.,
New Taipei City 244, Taiwan*

*Tel: +886 2 26099301
Fax: +886 2 26099303*

APPENDIX B

TEST PHOTOGRAPHS

(Model: 17Z90R)